

What is claimed is:

1. A transistor comprising:

5 a transparent channel layer using any one of zinc oxide ZnO, zinc magnesium oxide  $Mg_xZn_{1-x}O$ , zinc cadmium oxide  $Cd_xZn_{1-x}O$  and cadmium oxide CdO; and

a source, a drain and a gate, in which a transparent conductive material such as conductive ZnO doped or undoped with any one of group III elements, group VII elements, group I elements and group V elements, a transparent conductor such as  $In_2O_3$ ,  $SnO_2$  and  $(In-Sn)O_x$ , or a untransparent electrode material are used partially or entirely.

2. The transistor according to claim 1,

the transistor further comprising:

15 a gate insulating layer using a transparent insulating material such as insulative ZnO doped with elements capable of taking a valence of 1 as a valence number or doped with group V element, a transparent insulating oxide, or a transparent insulator between said transparent channel layer and said gate.

3. The transistor according to claim 1,

20 the transistor further comprising:

a gate insulating layer using a high dielectric transparent insulating material such as  $Zn_{1-x}Li_xO$  and  $Zn_{1-x}(Li_yMg_{x-y})$  between said transparent channel layer and said gate,

where said gate insulating layer has a memory function.

25 4. The transistor according to any one of claims 1 to 3,

the transistor further comprising:

a transparent insulating substrate on which said transparent channel layer is formed.

5. A semiconductor device, comprising:

30 the transistor according to any one of claims 1 to 4; and

a light emission portion formed of a region continuous to said drain or said source of said transistor or a region of another

semiconductor connected to said drain or said source, and a semiconductor layer jointed to said region.

6. A semiconductor device, comprising:

the transistor according to any one of claims 1 to 4; and

5 a capacitor formed by a region continuous to said drain of said source of said transistor or a region of another semiconductor or a conductor connected said drain and said source, said gate insulating layer or another insulating layer on said region, and a semiconductor layer or a conductive layer on said gate insulating  
10 layer or said another insulating layer.

7. A transistor, comprising:

an emitter and a collector, or a base made of a transparent n-type semiconductor such as ZnO doped with group III elements or group VII elements;

15 a base, or an emitter and a collector made of a transparent p-type semiconductor such as ZnO doped with group I elements or group V elements; and

a base electrode, an emitter electrode and a collector electrode, in which a transparent conductive material such as conductive ZnO doped or undoped with any one of group III elements, group VII elements and group I elements, a transparent conductor such as  $\text{In}_2\text{O}_3$ ,  $\text{SnO}_2$  and  $(\text{In-Sn})\text{O}_x$ , or an untransparent electrode material are used partially or entirely, the base electrode, the emitter electrode and the collector electrode being respectively  
20 formed on said base, said emitter and said collector.  
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8. A semiconductor device, comprising:

the transistor according to claim 7; and

a light emission portion formed of a region continuous to said collector or said emitter of said transistor or a region of  
30 another semiconductor connected to said collector or said emitter, and a semiconductor layer jointed to said region.

9. A semiconductor device, comprising:

the transistor according to claim 7, and

a capacitor formed of a region continuous to said collector and said emitter of said transistor or a region of another semiconductor or a conductor connected to said collector or said emitter, an insulating layer on said region, and a semiconductor layer or a conductive layer on said insulating layer.

10. A semiconductor device, wherein the transistor according to any one of claims 1 to 4 and 7 is stacked in plural with an insulating layer therebetween, the insulating layer using a transparent insulating material such as insulative ZnO doped with elements capable of taking a valence of one as a valence number or group V elements, a transparent insulating oxide, or a transparent insulator.

11. A semiconductor device, comprising:  
15 a plurality of the transistors according to any one of claims 1 to 4 and 7,

wherein a transparent conductive material such as conductive ZnO doped or undoped with group III elements, group VII elements, group I elements and group V elements, a transparent conductor such as  $\text{In}_2\text{O}_3$ ,  $\text{SnO}_2$  and  $(\text{In-Sn})\text{O}_x$ , or a untransparent electrode material is used for all of wiring or a part of the wiring between said transistors.

12. A semiconductor device, comprising:

the transistor according to any one of claims 1 to 4 and 7;  
25 an inductor made of a transparent conductive material such as conductive ZnO doped or undoped with group III elements, group VII elements, group I elements and group V elements, or a transparent conductor such as  $\text{In}_2\text{O}_3$ ,  $\text{SnO}_2$  and  $(\text{In-Sn})\text{O}_x$ .

13. A semiconductor device, wherein a plurality of the semiconductor devices according to any one of claims 5, 6, 8 and 9 are arranged in a matrix shape, and a capacitor or a light emission portion is driven by each transistor.